**High Strength Bolting Inspection**

# DSA Circular 17-4

Reference: California Building Code, Title 24, Part 1, Section 4-333 and Title 24, Part 2, Section 2231A.2

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Discipline: Structural

This circular is intended for use by the DSA plan review engineers and field engineers to indicate an acceptable method for achieving compliance with applicable codes. Its purpose is to promote uniform statewide criteria for use in plan and construction review of projects within the jurisdiction of DSA which include State of California public elementary and secondary schools (grades K-12), community colleges, and state-owned or state-leased essential services buildings. Other methods proposed by design professionals to solve a particular problem may be considered by DSA and reviewed for code compliance.

This Circular also applies to testing laboratories, technicians and special inspectors working on projects under DSA jurisdiction.

**1. Purpose:** The purpose of this Circular is to clarify the minimum requirements and responsibilities for special inspectors performing high strength bolting inspection. It is applicable to both shop and field bolting activities.

**2. Background:** The 2001 California Building Code requires testing of high strength bolts and continuous special inspection of all high strength bolting operations. Inspection of the installation and tightening of all high strength bolting shall be conducted in accordance with ANSI/AISC 341-05.

**3. Qualifications:** High-strength bolting inspectors shall meet the following minimum requirements:

**3.1** Have valid certification as a Structural Steel and Bolting Special Inspector by the International Code Council (ICC),

**3.2** Be not less than 25 years of age, and

**3.3** Must possess knowledge of the administrative requirements of Title 24 Part 1 and special high strength bolting requirements of Title 24, Part 2.

**4. Approval:** A high-strength bolting inspector shall be approved for each specific project prior to performing any inspection. Application for approval can be made on Form DSA-5 or Form DSA-150 (see Circular ??). To be approved for a project, the bolting inspector shall demonstrate the following to the satisfaction of DSA:

**4.1** The minimum requirements defined in Section 3. above,

**4.2** At least 3 years experience in construction or inspection work on projects similar to the project for which the inspector is applying, and

**4.3** That adequate time and attention will be provided to the project.

**5. Inspection Duties:**

**5.1** Review and understand the applicable portions of the DSA approved plans, specifications, field changes and other DSA approved documents. Approved shop drawings, erection drawings, referenced codes and standards must also be reviewed

and understood. (Note that shop/erection drawings are NOT DSA approved documents and shall NOT be used as a basis for acceptance).

**5.2** Review manufacturer's material test reports for conformance with documents listed in Section 5.1 above and conduct material identification for all bolting materials. Bolts, nuts, and washers must be in containers sealed by the manufacturer with accompanying mill test reports at the time of the inspection to be considered identifiable.

**5.3** Any Unidentifiable bolting materials shall be sampled and tested by a DSA approved laboratory facility as follows:

- Sample and test at least two complete fastener assemblies (bolt, nut and washer) for each manufacturer, type, designation and diameter.
- Conduct wedge tension and hardness test in all sampled fastener assemblies.

**5.4** Verify that all bolting material is stored in suitable containers, protected from dirt, moisture, and weather. Bolting materials shall also be controlled so that rejected materials, used materials or un-identified materials are not mixed with identified materials.

**5.5** Inspect the surface conditions of the bolts, nuts, and washers.

**5.6** Verify that all applicable bolt installation procedures are available on the project site, current and accurate.

**5.7** Verify that all bolt installers are familiar with the requirements and are able to install bolts in accordance with the accepted procedures.

**5.8** Observe the pre-installation testing of each fastener assembly lot prior to the start of work. Verify that the load indicating device (e.g., Skidmore-Wilhelm) is currently calibrated.

**5.9** If the calibrated wrench method of tightening is to be utilized observe the calibration of all wrenches at the start of each work shift. Verify that the load indicating device (e.g., Skidmore-Wilhelm) is currently calibrated.

**5.10** Inspect the condition of bolted joints prior to assembly as follows:

- Verify bolt hole size and condition, bolt diameter and shank lengths, and check for unfair reaming, flame cutting, or slotting of poorly aligned holes.
- Verify that faying surface requirements are met for slip-critical joints.

**5.11** Prior to pretensioning, verify that all bolts have been installed and the joint brought to the snug-tight condition.

**5.12** Inspect pretensioning operations to verify the proper application of the bolting procedures and conformance with the DSA approved documents and applicable standards.

**5.13** Mark completed joints that have been inspected and accepted with a distinguishing mark. The mark shall include: Testing laboratory initials (if applicable), inspector's initials, inspection date and status (e.g. HSB/OK).

## 6. Reporting:

**6.1** Provide daily inspection reports that clearly describe the inspection process. The report shall document all inspection duties listed in Section 5.0 above. Reports shall include a systematic list of accepted and rejected parts or joints. Reports shall clearly document joint locations by grid line, elevation or other acceptable means.

**6.2** Reports shall reference the details on the DSA approved documents used as a basis for inspection.

**6.3** Inspection reports must state that the work was inspected in accordance with and met the requirements of the DSA approved documents. Reports must be submitted as required by C.C.R. Title 24, Part 1, Section 4-333 (c). A sample special inspection form (DSA 250) is available on the DSA web site.

**6.4** Reports shall be sent to the school district and copied to the architect, structural engineer, project inspector, and DSA within 14 days of the date of the inspection. For high strength bolting, reports shall also be presented to the project inspector on a daily basis. Reports indicating non-compliance shall be submitted immediately.

**6.5** At the conclusion of the work, the high strength bolting inspector is required to sign and submit a verified report. The verified report shall be made on form (DSA 292) available on the DSA website

**7.0 Failure to Perform:** Failure by the special inspector to perform all required inspections in a professional and competent manner, report defective work, file all required reports in a truthful and timely manner, or fulfill any other duties defined by the code may have serious consequences for the special inspector including but not limited to withdrawal of DSA approval, and/or denial of any future DSA approval to work as a special inspector on projects under DSA jurisdiction.

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